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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Markku MÄNTYLÄ

Attn: PCT Branch

Application No. New U.S. National Stage of PCT/FI03/00297

Filed: October 4, 2004

Docket No.: 121344

For: METHOD AND APPARATUS FOR MEASURING AMOUNT OF COATING ON
PAPER WEB

**SUBMISSION OF THE ANNEXES TO THE
INTERNATIONAL PRELIMINARY EXAMINATION REPORT**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached hereto is a submission of the annexes to the International Preliminary
Examination Report (Form PCT/IPEA/409). The attached material replaces the claims.

Respectfully submitted,



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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

OCT 04 2004

Applicant's or agent's file reference 2011900PC/or		FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/FI2003/000297	International filing date (day/month/year) 15.04.2003	Priority date (day/month/year) 16.04.2002	
International Patent Classification (IPC) or national classification and IPC G01N33/34, G01N21/25, B05C3/18, D21H25/10			
Applicant Metso Automation OY et al			

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 4 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☒ (sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |

Date of submission of the demand 10.10.2003	Date of completion of this report 16.07.2004
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Åsa Malm/EÖ Telephone No. +46 8 782 25 00

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2003/000297

Box No. 1 Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
☐ publication of the international application (under Rule 12.4)
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☐ the international application as originally filed/furnished

☒ the description:
 pages 1-14 _____ as originally filed/furnished
 pages* _____ received by this Authority on _____
 pages* _____ received by this Authority on _____

☒ the claims:
 pages _____ as originally filed/furnished
 pages* _____ as amended (together with any statement) under Article 19
 pages* 15-17 received by this Authority on 15-04-2004
 pages* _____ received by this Authority on _____

☒ the drawings:
 pages 1-3 _____ as originally filed/furnished
 pages* _____ received by this Authority on _____
 pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing (*specify*): _____
☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing (*specify*): _____
☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2003/000297

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-20</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-20</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-20</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:

D1: US 5914490
D2: WO 0159435
D3: US 5455422
D4: US 5014288

The claimed invention is a method and an apparatus for measuring the amount of a coating on a paper web. Reflection measurements are performed both on the coating to be transferred to the web and on the coating on the web. The amount of the coating on the web is adjusted on the basis of the measurements.

D1 describes a procedure and an apparatus for measuring the amounts of the coating components of paper (abstract). The amount of at least one of the components of the coating of the paper web is continuously determined by reflection measurements based on infrared technique (column 1, lines 54-60, column 2, lines 38-43). The components of the coating of the paper web, which measurements are performed on, can be pigments (column 3, lines 64-67).

D2 describes a method and an apparatus for measuring the amount of a coating on a paper web or a board (abstract). The amount of at least one component of the coating is measured and the amount of coating on the paper is determined from the measurements. The amount of the coating on the paper web or board can be adjusted on the basis of the measurements (page 20, lines 20-25).

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Box V

When performing the measurements, the paper web or the board, is illuminated by IR-radiation (page 14, lines 4-6), and the reflected light is detected (page 13, lines 7-25).

D3 describes a method and an apparatus for measuring the amount of coating on a paper web (abstract) using infrared radiation. The amounts of different components of the coating are measured (column 4, lines 54-67). The composition of the coating is known and hence the amount of the coating on the paper web can be determined by a computer. The computer can generate a control signal to regulate the amount of coating on the paper web (column 6, line 62 - column 7 line 19). The measurements are done continuously.

D4 describes a method and apparatus for determining the amount of coating spread on a continuously moving paper web (abstract). X-ray beams are directed through the paper. The transmitted x-rays are detected and transformed into signals which are sent to a computer to determine the total amount of the coating on the paper web (column 4, lines 40-55). The computer is also connected to a regulating means (36) which regulates the amount of coating on the paper web (column 6, lines 27-34).

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed method and apparatus for measuring the amount of coating on a paper web.

Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-20 is novel and is considered to involve an inventive step. The invention is industrially applicable.

CLAIMS

1. A method of measuring the amount of a coating on a paper web, in which method the amount (CA) of at least one component of the coating (2) on the paper web (1) is measured, **characterized** by

5 measuring the composition (CC) of the coating (2) to be transferred to the paper web (1), and

determining the amount (CW) of the coating (2) on the paper web (1) on the basis of the amount (CA) of at least one component of the coating (2) on the paper web (1) and the composition (CC) of the coating (2) to be
10 transferred to the paper web (1).

2. A method as claimed in claim 1, **characterized** by further adjusting the amount (CW) of the coating (2) on the paper web (1) on the basis of the measurement of the amount (CW) of the coating (2) on the paper web (1).

15 3. A method as claimed in claim 1 or 2, **characterized** by measuring the amount (CA) of at least one component of the coating (2) on the paper web (1) by reflection measurement.

20 4. A method as claimed in claim 3, **characterized** by measuring the amount (CA) of at least one component of the coating (2) on the paper web (1) by reflection measurement based on infrared technique.

5. A method as claimed in any one of the preceding claims, **characterized** by determining the composition (CC) of the coating (2) to be transferred to the paper web (1) by reflection measurement based on infrared technique.

25 6. A method as claimed in any one of claims 1 to 4, **characterized** by determining the composition (CC) of the coating (2) to be transferred to the paper web (1) by Raman spectroscopy based on molecular vibration spectroscopy.

30 7. A method as claimed in any one of the preceding claims, **characterized** by measuring the amount (CA) of at least one component of the coating (2) on the paper web (1) continuously.

35 8. A method as claimed in any one of the preceding claims, **characterized** by the amount (CA) of at least one component of the coating (2) on the paper web (1) being the amount of a pigment in the coating on the paper web (1).

9. A method as claimed in any one of the preceding claims, **characterized** by determining the composition (CC) of the coating (2) to be transferred to the paper web (1) continuously.

5 10. An apparatus for measuring the amount of a coating on a paper web, **characterized** in that the apparatus comprises
a first measuring device (17) arranged to measure the amount (CA) of at least one component in the coating (2) on the paper web (1) by reflection measurement,

10 a second measuring device (18) arranged to measure the composition (CC) of the coating (2) to be transferred to the paper web (1), and

15 a data processing device (19) arranged to determine the amount (CW) of the coating (2) on the paper web (1) on the basis of the amount (CA) of at least one component of the coating (2) on the paper web (1) and the composition (CC) of the coating (2) to be transferred to the paper web (1).

11. An apparatus as claimed in claim 10, **characterized** in that the apparatus further comprises a control device (20) arranged to adjust the amount (CW) of the coating (2) on the paper web (1) on the basis of the measurement of the amount (CW) of the coating (2) on the paper web (1).

20 12. An apparatus as claimed in claim 10 or 11, **characterized** in that the first measuring device (17) is arranged to measure the amount (CA) of at least one component of the coating (2) on the paper web (1) by reflection measurement.

25 13. An apparatus as claimed in claim 12, **characterized** in that the first measuring device (17) is arranged to measure the amount (CA) of at least one component of the coating (2) on the paper web (1) by reflection measurement based on infrared technique.

30 14. An apparatus as claimed in any one of claims 10 to 13, **characterized** in that the second measuring device (18) is arranged to determine the composition (CC) of the coating (2) to be transferred to the paper web (1) by reflection measurement based on infrared technique.

35 15. An apparatus as claimed in any one of claims 10 to 13, **characterized** in that the second measuring device (18) is arranged to determine the composition (CC) of the coating (2) to be transferred to the paper web (1) by Raman spectroscopy based on molecular vibration spectroscopy.

16. An apparatus as claimed in any one of claims 10 to 15, **characterized**

a c t e r i z e d in that the first measuring device (17) is arranged to measure the amount (CA) of at least one component of the coating (2) on the paper web (1) continuously.

5 17. An apparatus as claimed in any one of claims 10 to 16, **c h a r - a c t e r i z e d** in that the amount (CA) of at least one component of the coating (2) on the paper web (1) is the amount of a pigment in the coating (2) on the paper web (1).

10 18. An apparatus as claimed in any one of claims 10 to 17, **c h a r - a c t e r i z e d** in that the second measuring device (18) is arranged to determine the composition (CC) of the coating (2) to be transferred to the paper web (1) continuously.

15 19. An apparatus as claimed in any one of claims 10 to 18, **c h a r - a c t e r i z e d** in that the second measuring device (18) is arranged in a coating colour reservoir (4) in a coating head (3), in a coating (2) mixer (13), in a feed line between the mixer (13) and the coating colour reservoir (4) or in a separate sample line leaving the coating colour reservoir (4).

20 20. An apparatus as claimed in any one of claims 10 to 18, **c h a r - a c t e r i z e d** in that the second measuring device (18) is arranged in a coating colour reservoir (4) in a coating head (3), in a coating (2) storage or machine tank, in a transfer line between the storage and machine tanks, in a transfer line between the machine tank and the coating colour reservoir (4), in a separate sample line leaving the storage or machine tank or in a separate sample line leaving the coating colour reservoir (4).